phere, which turned from northeast to southwest. From the 24th to 26th very hot, with threats of rain in the afternoon, and very dense smoke everywhere in the San Jose and Alajuela basins. From the 27th to the end of the month the northeast trade wind was again dominating from the surface of the country up to the highest strata of the atmosphere, as indicated by the clouds.

Notes on earthquakes.—March 11, 2h. 51m. 30s., a. m., heavy shock, west to east; intensity, 3; duration, 16 seconds. March, 12, 4h. 44m. p. m., slight shock, northeast to southwest, intensity, 2; duration, 2 seconds.

TABLE 3.—*Rainfall at stations in Costa Rica*, 1901.

Stations.	January.		February.		March.	
	Amount.	No. rainy days.	Amount.	No. rainy days.	Amount.	No. rainy days.
	Mm.		*Mm.*		*Mm.*	
1. Boca Banano	265	17	98	11	278	14
2. Limon	304	19	72	9	214	15
3. Swamp Mouth	.....	.....	131	10	241	13
4. Zent	.....	.....	.....	.....	.....	.....
5. Gute Hoffnung	411	15	106	14	224	12
6. Siquirres	406	10	45	4	160	8
7. Guapiles	340	18	114	8	... .	.....
8. Sarapiqui	.....	.....	.....	.....	.....	.....
9. San Carlos	301	19	67	14	96	13
10. Las Lomas	521	16	131	10	181	14
11. Peralta	335	11	65	4	190	13
12. Turrialba	.....	.....	.....	.....	.....	.....
13. Juan Vinas	159	14	40	10	12	6
14. Santiago	.....	.....	.....	.....	.....	.....
15. Paraiso	.....	.....	.....	.....	.....	.....
16 San Rafael C	.....	.....	.....	.....	.....	.....
17. Tres Rios	2	1	5	1	... 0	 0
18. La Palma	.....	.....	.....	.....	.....	.....
19. S. Francisco G	7	2	9	1	26	1
20. San Jose	4	2	9	1	24	1
21. La Verbena	.....	.....	5	2	6	2
22. Alajuela	 0	 0	1	1	.....	.....
23. Nuestro Amo	....	....	11	2	50	3
24. Sipurio	....	.....	.....	.....	149	12

DAMAGE BY HAIL IN SPITE OF CANNONADING.

By Prof. J. M. PERNTER.

[Translated from the Meteorologische Zeitschrift for March, 1901, page 135.]

In the January number of the Meteorologische Zeitschrift we stated with what exuberant certainty the great majority of the participants in the congress at Padua asserted the efficacy of the cannonading against hail. There were really no satisfactory proofs of this assertion and we stated the conditions that must be fulfilled by any acceptable demonstration of the fact. Practically, however, as the matter now stands it is greatly to be desired that we should know exactly what results have been obtained, and for this purpose we must not only be informed as to the successes, but also as to the failures. In spite of the very proper demand of Professor Poggi these latter never came up for close demonstration and discussion at the Padua congress; the members of the congress would not admit that there had been any failures. Nevertheless, it is necessary to know about them. Since in order to judge of the truth of the matter it is necessary for the meteorologist to be informed as to these details, we would call attention to the report for the last year's cannonading season, made by the inspector-general of the Italian Hail Insurance Company to the directors in Milan (Relazione dell' ispettore generale, Ingegnere Giuseppe Stabilini, sull' esito spari contro le nubi nel 1900 e nel congresso grandinifugo tenuto in Padova nel Novembre 1900). In this report Señor Stabilini cites 16 cases in which, so far as can be seen, he is actually in a position to show that in spite of all the severe and prolonged shooting some severe hail and some very severe damage from hail was done in the cannonading region itself. The accuracy of these facts is quite beyond doubt. It is so much the more to be regretted that the Weather Shooting Congress in Padua did not take advantage of the opportunity to investigate these cases more fully. For each case we should know: (1) the area of the region provided with cannonading apparatus; (2) its extent in latitude and longitude; (3) the distances of the cannon from each other; (4) the dimensions of the cannon; (5) the quantity of the charges of powder and the frequency of shots. If, further, the path of the storm and hail were given, then a discussion of the causes of failure in each case might profitably have taken place. On the authority of his report, Señor Stabilini concludes that the cannonading is almost useless. This is, however, too hasty a conclusion and not logically justified by the report. It is, however, very disquieting that in so many cases heavy and most severe damage should have been done in spite of the "best shooting."

I repeat again and again that it appears to me most probable that the smallness of the apparatus and the light charges have, through the facts brought forward by Señor Stabilini, now been proved to be insufficient; it does no good to shut our eyes to the facts.

Professor Pernter has elsewhere stated his desire that the heaviest charges of powder may be used, and the most thorough local investigation be made in order that the efficacy of cannonading be proved or disproved once for all. He considers the current delusion as an admirable chance to promote the study of thunderstorms and hail.—ED.

MONTHLY STATEMENT OF AVERAGE WEATHER CONDITIONS FOR MARCH.

By Prof. E. B. GARRIOTT.

The following statements are based on average weather conditions for March, as determined by long series of observations. As the weather of any given March does not conform strictly to the average conditions, the statements can not be considered as forecasts:

In March the storms of the middle latitudes of the North Atlantic Ocean are more numerous but less severe than during January and February. Fresh southerly winds prevail from the British Isles to the Grand Banks, and northwest winds from the Grand Banks to the United States coast. But little fog is encountered in the transatlantic steamship tracks. The southward movement of icebergs over the Banks of Newfoundland usually begins late in February or early in March. In the West Indies severe wind storms seldom occur during the dry season, which continues from November to April.

Although the wet season in the Pacific coast States of the United States continues from October to May, fully one-half of the annual rainfall occurs from December to February. In the Plateau regions the monthly rainfalls do not differ materially during the fall, winter, and spring months. Over the Great Plains which stretch from the Rocky Mountains to the Mississippi River, the monthly rainfall increases from February to June. East of the Mississippi the differences in the monthly rainfalls are not conspicuous, except that there is a general tendency toward a maximum in the summer months.

Although heavy snowstorms are practically unknown in the Southern States in March, and of infrequent occurrence in the northern districts, some very remarkable and memorable snowstorms have visited the northern districts of the United States in that month, principal among which may be placed the great storm of March, 1888, which proved so destructive to life and property in the Northeastern States. All of the severe March snowstorms of the Northeastern States have attended storms which have advanced from the southwest quarter.